

What is claimed is:

1. An electrochemical cell stack comprising:

at least two electrochemical cells, wherein each electrochemical cell comprises a hollow elongated electrolyte, having disposed upon it an anode and a cathode, and further wherein with the exception of the outermost cell, each electrochemical cell is placed within another electrochemical cell in a manner such that at least one of the surfaces of the respective electrochemical cells are approximately parallel to one another.
2. The stack of Claim 1, wherein successive electrochemical cells are arranged to have either the anodes or the cathodes of a given successive pair of electrochemical cells circumferentially opposed to each other.
3. The stack of Claim 1, wherein successive electrochemical cells are arranged in such a manner that for any three successive electrochemical cells there is at least one pair of anodes circumferentially opposed to one another and at least one pair of cathodes circumferentially opposed to one another.
4. The stack of Claim 1, wherein the electrochemical cells are attached to each other by spacers.
5. The stack of Claim 1, wherein the electrochemical cells are separated by spacers which comprise nickel, nickel alloys, metals coated with the yttria stabilized zirconia or lanthanum strontium gallium magnesium oxides, glass, ceramics, polyimides, polybenzimidazoles, liquid crystalline polymers, ceramics containing glass fibers, metal fibers, glass particles, metal particles, polymeric fibers or combinations comprising at least one of the foregoing.
6. The stack of Claim 1, wherein the stack is disposed upon a base plate, and wherein a longitudinal axis of the stack is perpendicular to a surface of the base plate.

7. The stack of Claim 6, wherein the base plate comprises nickel, nickel alloys, metals coated with the yttria stabilized zirconia or lanthanum strontium gallium magnesium oxides, glass, ceramics, polyimides, polybenzimidazoles, liquid crystalline polymers, ceramics containing glass fibers, metal fibers, glass particles, metal particles, polymeric fibers or combinations comprising at least one of the foregoing.

8. The stack of Claim 7, wherein the base plate comprises grooves into which the electrochemical cells are disposed.

9. The stack of Claim 1, wherein at least two successive electrochemical cells are equidistantly spaced from one another.

10. The stack of Claim 1, wherein at least two successive electrochemical cells are not equidistantly spaced from one another.

11. The stack of Claim 1, wherein the electrochemical cells are concentrically arranged.

12. The stack of Claim 1, wherein the electrochemical cells are eccentrically arranged.

13. The stack of Claim 1, wherein the respective anodes and cathodes of the electrochemical cells are in electrical communication either in series or parallel with a resistive load.

14. The stack of Claim 1, wherein oxygen flows between a pair of cathodes while hydrogen flows between a pair of anodes.

15. The stack of Claim 1, wherein the hollow elongated electrolyte, the anode, the cathode or any combination of the foregoing may be used as the supporting structure for the individual electrochemical cells.

16. The stack of Claim 1, wherein an edge of an individual electrochemical cell has a triangular, square, rectangular, circular, semi-circular, hexagonal, pentagonal, decagonal shape or combinations comprising at least one of the foregoing shapes.

17. The stack of Claim 1, wherein successive electrochemical cells are separated by a distance of about 0.5 millimeter to about 20 millimeters.

18. The stack of Claim 1, wherein the hollow elongated electrolyte is formed from yttria stabilized zirconia, lanthanum strontium gallium magnesium oxide, silicon carbide containing phosphoric acid, proton conducting polymer membranes, molten carbonate salt, alkaline electrolytes, or combinations comprising at least one of the foregoing electrolytes.

19. The stack of Claim 1, wherein the anode is formed from platinum, ruthenium, iridium, rhodium, palladium, molybdenum, or combinations comprising at least one of the foregoing metals disposed upon carbon paper or carbon fibers.

20. The stack of Claim 1, wherein the anode is formed from ceramic powders, wherein the ceramic powders are nickel oxide, cobalt oxide, nickel zirconia, nickel oxide with yttrium stabilized zirconia, nickel oxide with samarium doped ceria, nickel with yttria stabilized zirconia, or combinations comprising at least one of the foregoing ceramic powders.

21. The stack of Claim 1, wherein the cathode is formed from ceramic powders, wherein the ceramic powders are lanthanum-samarium-cobalt, samarium-strontium-cobalt, samarium-strontium-cobalt oxide, strontium doped lanthanum manganite, lanthanum manganite, or combinations comprising at least one of the foregoing ceramic powders

22. The stack of Claim 1, wherein the cathode is formed from platinum, ruthenium, iridium, rhodium, palladium, molybdenum, or combinations comprising at least one of the foregoing metals disposed upon carbon black.

23. A fuel cell comprising the stack of Claim 1.

24. A sensor comprising the stack of Claim 1.

25. A oxygen pump comprising the stack of Claim 1.